DOCUMENT RESUME

ED 200 322 PS 012 083

AUTHOR Embry, Dennis D.; Malfetti, James L.
TITLE The Effects of Storybooks on Preschoolers' Outdoor Play or "Never Put Your Feet in the Street..."
INSTITUTION Kansas Research Inst. for the Early Childhood Education of the Handicapped, Lawrence.
SPONS AGENCY AAA Foundation for Traffic Safety, Falls Church, Va.; Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
REPORT NO ECI-138
PUB DATE Jun 80
CONTRACT 300-77-0308
NOTE 68p.

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Accident Prevention; *Imitation; Inhibition; Observational Learning; Parent Responsibility; Pedestrian Traffic; *Preschool Children; Preschool Education; *Research Methodology; *Safety Education; Story Reading; *Traffic Safety

ABSTRACT

A reduction of children's play in the street was the goal of this study, the first in a series of studies designed to reveal possible solutions to pedestrian and motor vehicle accidents. The effects of of specially designed storybooks (read to children at preschool) on the frequency and duration of children's on the street behavior when playing near their homes were examined. Using a multiple baseline design across subjects, observations were made of four preschool-age children's frequency and duration of play in the street, the presence of their peers, and the quantity and quality of parental supervision. The setting for the observation was a high traffic area near a large apartment complex. Results indicated that reading the storybooks had a temporary effect on decreasing both the frequency and the duration of the children's play in the street. Reasons for the short-lived effects were hypothesized, and various ancillary findings were discussed, including suggestions for making the results more durable. References are included and a sample outdoor data observation sheet is appended. (Author/JA)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

SCOPE OF INTEREST NOTICE
The ERIC Facility has assigned this document for processing to: EC PS

In our judgement, this document is also of interest to the clearinghouses noted to the right. Indexing should reflect their special points of view.

ED200122

THE EFFECTS OF STORYBOOKS ON PRESCHOOLERS' OUTDOOR PLAY

OR

"NEVER PUT YOUR FEET IN THE STREET. . ."

by

Dennis D. Embry
Early Childhood Institute
The University of Kansas

and

James L. Malfetti
Safety Education and Research Project
Columbia University

(ECI Document No. 138)

June 1980

PS012083

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Kansas Res. Inst. for the Early Childhood Education of the Handicapped
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

NOTICE

No portion of this paper to be reproduced or quoted without consent of author.

Additional copies of this document may be purchased, at cost, from:

Early Childhood Institute
DOCUMENT REPRINT SERVICE
Haworth Hall (Summerfield Annex A)
The University of Kansas
Lawrence, Kansas 66045

Phone: (913) 864-5600

ACKNOWLEDGEMENTS

The research described herein was underwritten principally by a grant from the AAA Foundation for Traffic Safety; some aspects of the research were supported through a contract with the Bureau for the Education of the Handicapped (USOE 300-77-0308).

Several people generously devoted their efforts to make this research and the subsequent account of it possible. None of what follows could have been done without the talented illustrations by Nancy Ness in the four storybooks. We thank Harriet Shaffer for training the children among her many other support activities, and we are indebted to Jessie Whitlock for braving the heat and the cold to observe the children. The hard work and thought of Randy L. Loebig in the early preparation of this research and the co-authoring of the storybooks can never be repaid.

Finally, we thank Drs. Donald M. Baer and Lynne H. Embry for their consultations.

D.D.E.

J.L.M.

ABSTRACT

Children enjoy playing outdoors, but playing around traffic leads to pedestrian and motor vehicle accidents, the second leading cause of death among preschool-age children. This problem has received scant attention from either educators or researchers. The present experiment is the first in a series of studies designed to reveal possible solutions.

After a review of the literature on accidents and child development, the research team chose a reduction of children's play in the street as the goal of the study. The authors offered a rationale for the use of specially designed storybooks as the sole intervention. Using a multiple-baseline design across four children, the effects of storybooks read at preschool on the frequency and duration of children's in-street behavior (when playing outdoors near their homes) were evaluated. The results indicated a temporary effect of storybooks.

Reasons for the short-lived effects were hypothesized, and various ancillary findings of interest were discussed, including suggestions for making the results more durable.

DESCRIPTORS: Pedestrian safety, preschool-age children, storybooks, imitation, inhibition, research methodology, and accident prevention.

TABLE OF CONTENTS

Abstract iii
Introduction 1
Method 6
Subjects 6
Setting 6
Materials 8
Data Collection 14
Experimental Procedures 22
Experimental Design 23
Results 25
Discussion 37
References 52
Appendix A: Sample Outdoor Data Sheet 59

Playing outdoors enlivens young children, but playing around traffic results in 12,000 deaths and injuries of preschool-age (0-4 years) each year in the United States who are the victims of pedestrian and motor-vehicle accidents (National Safety Council, 1977). While the numbers vary, the magnitude of the problem is just as severe in other industrialized nations (Petersson, 1977). Few scientists or educators have addressed this problem, and it begs for a solution--for it is the second leading cause of death for children between the ages of two and four (Vital Statistics, 1977, 1979).

A search for a solution must begin with a review of the problem. First, reflect on the location of such accidents. They occur near the child's home and at mid-block; they rarely occur at an intersection (National Safety Council, 1977). Second, note the activities of the children involved. Typically, young children were engaged in some form of play compared to purposeful street crossing (e.g., Russam, 1977; Grayson, 1975; Pedestrian Safety Report, 1968), and the children often failed to resist the temptation to go into the street (Gunther & Limbourg, 1976). Third, consider the age-related skills of young children. Preschool-age children lack mastery of such skills as perception of velocity, distance, causality, and time estimation that are crucial for safe street crossing (e.g., Avery, 1974; Crowder & Hohle, 1970; Siegler & Richards, 1979), and no apparent evidence in the literature exists that preschoolers can be reliably taught these age-related skills and maintain them in their natural environments.

Note some behavioral, ecological and socio-economic factors related to such accidents. One-third of the accidents happen while an adult is supervising the child (Russam, 1977); the child subsequently escapes the "control" of the

older person (Grayson, 1975). Children involved in such accidents frequently come from families experiencing stress (e.g., marital difficulties, child-parent problems, and illnesses). The accidents disproportionately happen to children from low-income families, single-parent families, etc. (Backett & Johnston, 1959). Thus, there are definite behavioral and ecological factors associated with the incidence of pedestrian accidents involving young children.[1]

These observations suggest some directions for an attack on the problem. (1) The focus should be on reducing the frequency of entering the street and duration of play in the street. (2) Independent street crossing should not be taught to preschool-age children (2-4 years old). (3) Some attempt should be made to alter the pattern of child-parent interactions, at least regarding safety-related behavior. (4) Intervention programs should be conducted in settings likely to reach families whose children are higher risks for being involved in such accidents. Fortunately, such families can be reached by developing materials for use in Early Childhood Education, because large numbers of high-risk children are enrolled in daycare and preschool by virtue of federal law (e.g., Head Start). While these directions offer an orientation, they do not define specific paths to be followed.

Further reflection, however, offers some thoughts about certain paths to taken. (a) Children's traffic-related behavior is most likely to change if models (e.g, a TV character) are presented that children esteem (Dueker, 1975), and the target behavior is directly reinforced

---

[1] As there are child-related factors, there may also be special factors associated with the drivers involved in child-pedestrian accidents (Baker, Robertson, & O'Neill, 1974), but no analysis for this category of drivers alone has been published. Unfortunately, no reliable detection and intervention program for such drivers exists (Haddon, 1980).

(Jackson, Cowart, & Mayville, 1972[2]; Page, Iwata, & Neef, 1976; and Yeaton & Bailey, 1978). (b) A program based in the home and the school seemingly holds the best chance of success: the school offers a group context for changing the behavior of parents, a context that appears to be critical (e.g., Lewin,1952; Wahler, Note 1); and home-based training (mediated by parents) is vital for the maintenance and generalization of children's traffic-safety behaviors (cf. Downing, 1975; Gordon, 1977; Kueting, Boigs, & Winkler, 1978). The school can also teach children various concepts about traffic safety. (c) Common sense and anecdote suggest that the materials devised for use in early childhood settings should reinforce pre-academic objectives, lest the program compete for scarce time and fall into disfavor with teachers (Spolander & Dahlstedt, 1977). Fortunately, information exists to guide one down these three paths.

The literature on modeling and imitation is extensive though not exhaustive. Nevertheless, an examination of that literature shows that imitation by young children can be facilitated if:

(a) First-person pronouns are used to describe the model's speech as compared to third-person pronouns (Jakibchuk & Smeriglio, 1976);

(b) The model and the observing child are similar in age, sex and race (e.g., Melamed, Meyer, Gee, & Soule, 1976);

(c) The model is present during times that the observing child is not reinforced for imitation (Lupercio & Ribes, 1976);

(d) Visual information is provided for tasks involving motoric behavior (Vladimir, 1976);

(e) The model receives a high percentage of vicarious reward (Thelen & Rennie, 1972); and

---

[2]Reading (1973) uses data and findings from Jackson, Cowart, & Mayville (1972) without citing the original researchers.

(f) The observing child covertly or overtly is expected to imitate (Thelen & Rennie, 1972).

That literature also reveals that imitation can be inhibited if modeled behavior is vicariously punished (e.g., Bandura, 1965; Dubanoski, 1967; Walters & Parke, 1964).

A program that can be used at both school and home and still change a child's behavior may present a challenge. School personnel often resist implementing a new program, and parents often have difficulty trying to change their children's behavior (e.g., Embry, Herbert-Jackson, Kelly, & Baer, 1978). Among researchers and educators, a folklore has emerged about ways to ameliorate these difficulties. Occasionally, there are data to corroborate the folklore. McLaughlin (1976) nicely characterizes that folklore and data about teachers; specificially, she enumerates features of programs likely to be adopted by teachers:

(a) Ease of explanation and communication to others,

(b) Possibility of a trial on a partial or limited basis,

(c) Ease of use,

(d) Congruence with existing values, and

(e) Obvious superiority over previous practices.

L. Embry (Note 2) has made corresponding observations about programs to change parental behavior. Apparently, similar principles apply in changing both teacher and parent behavior.

Often, an overarching objective of early childhood education is language development. A well conceived traffic-safety program might reinforce this objective.

An inspection of the educational settings and of the homes of preschoolers, and current research all prompt the conclusion that children's storybooks are an appropriate medium for presenting symbolic models to young children about traffic safety. Consider some of the reasons for that conclusion. (a) Storybooks are found in homes and schools almost everywhere, and new storybooks per se offer no departure from existing values and activities. (b) Teachers, parents, and children are all accustomed to storybooks so that new ones should pose no problems. (c) Storybooks, by their nature, are flexible and subject to partial or limited use (unlike films or videotapes, which are also more expensive and require elaborate equipment). (d) Research discloses that repeated exposure to storybooks can improve children's language development (Irwin, 1969; Boroughs, Note 3). (e) Laboratory research and clinical studies tell us that storybooks can promote imitation by children or concept learning (e.g., Fischer & Torney,1976; Zebrowitz-McArthur & Eisen, 1976; Kelly, L. Embry, & Baer, 1979). (f) Experimental findings about facilitating imitation can be adapted to the design of storybooks. (g) Experimental research is uncovering methods of improving the instructional effectiveness of storybooks (D. Embry, Note 4; cf. Lutzker, Croiser, & Lutzker, in press). Thus, well designed storybooks might offer an effective medium for symbolic modeling about pedestrian safety for young children.

This study examines the effects of specially designed storybooks, read at preschool or a preschool-like environment, on the traffic-related behavior of preschool-age children near their homes. It reports repeated

measures of the frequency and duration of children's play in the street, the quantity and quality of parental supervision of their children, and the presence outdoors of children's peers.

METHOD

Subjects

Four preschool-age children served as subjects. At the start, their ages were: Cal, 3 years; Mac, 5 years; Abby, 2 years; and Al, 3 years.[3] Cal, Mac, and Abby attended a preschool/daycare center that serviced a cross section of the community. These children were selected because their families were the first to return consent forms; the exception is Al, who was recruited to replace an earlier subject who almost never entered the street during baseline observations.

Cal had been previously treated for serious language delay and behavior problems, although at the time of the study, those problems were much less evident. Both Cal and Mac lived with single parents. English was the native language of all parents and children.

Setting

Three children heard storybooks in a room (approximately 3m by 4m), which adjoined one of the preschool classrooms. A small table and several chairs were the main furniture. A small window in the door enabled a reliability observer to view the trainer and child. One child (Al) heard the storybooks in a room (approximately 5m by 8m), which was located in the community building of a 160-unit apartment complex. The reliability observer viewed the trainer and child through a door that was slightly ajar.

---

[3]The names used throughout this study are pseudonyms.

All children lived at the same 160-unit apartment complex, where observations of the children's behavior outdoors were made. About 300 children lived in the apartment complex, and most of them were below age 10. Approximately 75% of the families living there received a subsidy to help pay monthly carrying charges.

Vehicular traffic to and from the complex flowed through one, dead-end central street, with small cul-de-sacs perpendicular to the street providing parking space for residents of 16 to 24 apartments clustered together.

The whole apartment complex was generously equipped with sidewalks, playground equipment, and open yards. The grounds were inviting places for the children to play, and there was no apparent need for young children to play in the street.

Before baseline data were collected, the first author and research assistants had witnessed several "near misses." in which cars and young children narrowly escaped colliding. The monthly newsletter of the apartment complex always contained exhortations to drivers to watch for children and to parents to keep their children out of the street. Aggregate data collected several months before the experiment indicated that young children entered the street 5 to 25 times per hour. At the entrance to the apartment complex, vehicular traffic density was measured at approximate times during which the observations occurred; the traffic density ranged from 90-125 vehicles per hour. That density declined as one moved further from the entrance to the end of the drive. Children were observed at virtually every point from the entrance to the end of the drive.

The apartment complex at which the research took place was part of a larger community of 60,000 persons in which ten pedestrian-vehicle accidents involving preschoolers had been reported for the years 1972-1977; one of those accidents resulted in the death of a child, and four in incapacitating injuries.

Materials

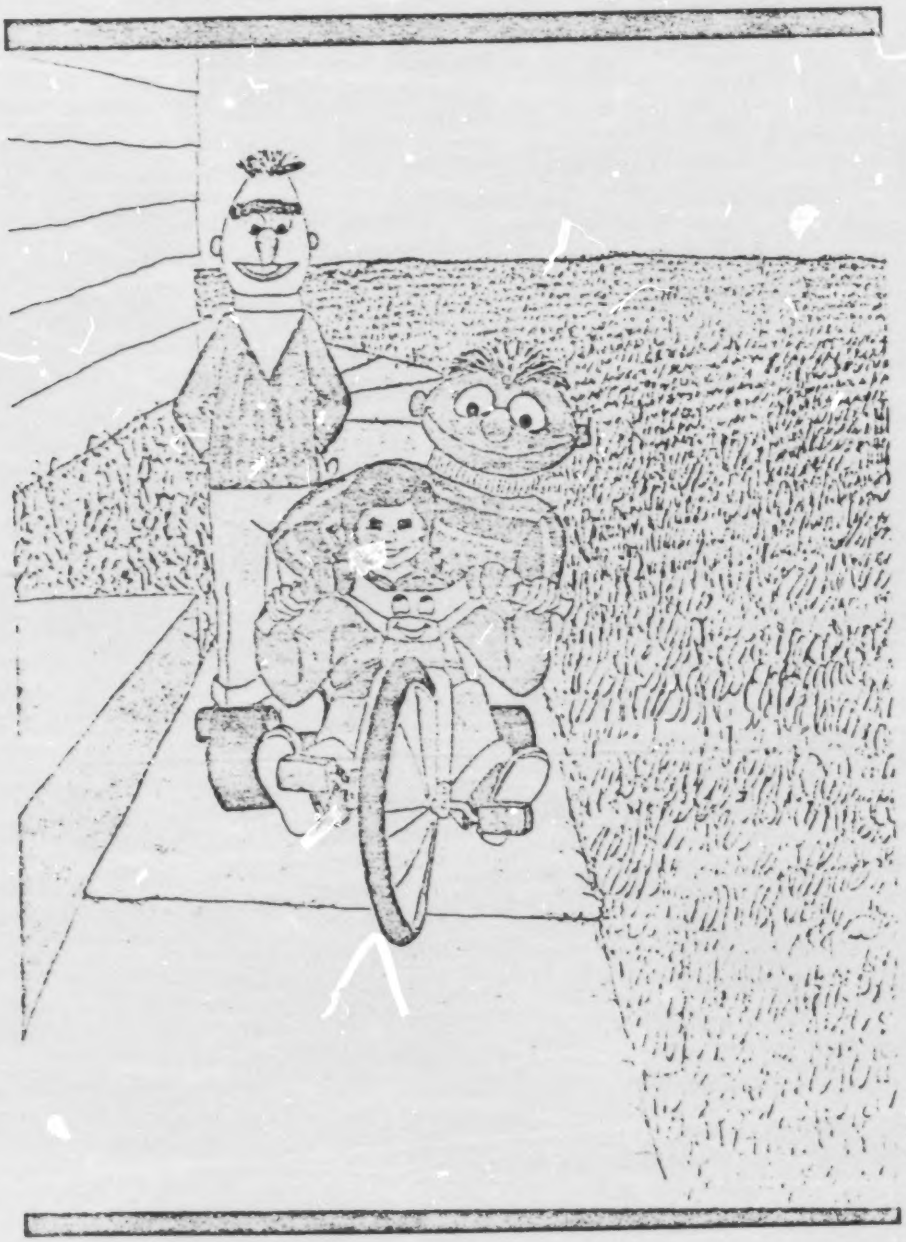
Four storybooks were especially created for this study. They were similar both in their format and content.

Format. All storybooks were illustrated, because research has conclusively shown the benefit of illustrations to children's comprehension of oral prose (Levin, Bender, & Lesgold, 1976; Gutman, Levin, & Pressley, 1977; Embry, Loebig, & Baer,1980). Visual information also facilitates imitation involving motor behavior (Vladimir, 1976). The illustrations were colored outline drawings, with a minimum of interior detail and shading. The colors were bright but realistic. The background scene for each illustration was simple, with few embellishments (e.g., flower boxes on houses with brightly colored flowers with a few insects nestled among the flowers). Such embellishments can be distracting and may inhibit learning (e.g., Rincover & Koegel, 1975). Characters were drawn with expressive faces. The overall style of illustrations chosen is one which children apparently prefer (viz., French, 1952; Loeb, 1964; Rudisill, 1952; Stewig, 1975) and will benefit children's learning (Brooks, 1977; Miller, 1938; Travers, 1969). Figure 1 is a sample illustration.

When the storybooks were opened, the illustration appeared on one side and the prose on the other, usually three sentences.

Figure 1

Facsimile of Sample Illustration from Storybooks



There were some common characteristics about the formal prose structure. First-person pronouns (I, me, or my) were used frequently to denote the protagonist, because first-person speech has been shown to facilitate imitation (Jakibchuk & Smeriglio, 1976). The authors seldom used the passive voice ("The bigwheel was ridden by Big Bird."), since young children have difficulty understanding it (Brown, 1976; Lovell & Dixon, 1967). Finally, a question about the story's content appeared at the bottom of most prose pages; some research suggests that imitation by preschoolers will be facilitated by such rehearsal (Toner, Parke, Ross, & Yussen, 1978).

Content. A number of content features were common to all four storybooks. The illustrations depicted an androgynous protagonist. Other models were characters from Sesame Street (a popular TV show for young children),[4] who were chosen because previous reserach on imitation and children's traffic-related behavior had revealed the importance of using child-esteemed models (Dueker, 1975).

One aspect of the prose stood out: the name of the protagonist was always left blank so that the trainer could fill in the name of the listening child. Clinical studies using video tapes to change deviant children's behavior reveal that such personalization is quite powerful (e.g., Dowrick & Raeburn, 1977), and clinical studies with storybooks underscore the effect (Issacs, Note 3; Kelly, L. Embry, & Baer, 1979).

---

[4]The authors gratefully acknowledge the assistance of Children's Television Workshop in allowing the use of the characters for this research.

Furthermore, recent research shows that comprehension, thought to be a key variable in the process of imitation (Whitehurst, 1977), of aural prose is doubled by such personalization (D. Embry, Note 4). Moreover, such a procedure should strengthen a child's identification with the symbolic model, an important variable in facilitating imitation (e.g., Melamed, Meyer, Gee, & Soule, 1976; Rosekrans, 1967). Finally the "model" (i.e., the listening child) would be present during periods of nonreinforced imitation (outdoors at play), and this might result in greater resistance to extinction of imitative behavior (e.g., Lupercio & Ribes, 1976). Children delighted in the novelty of a book about themselves.

Some common themes ran across the four books. First, the safety of playing on the grass or sidewalk and the danger of playing in the street were both emphasized. Second, the idea of safe behavior was reinforced through praise, the award of a "Big Bird Safety Button", or both. Such vicarious reinforcement should increase imitation (Thelen & Rennie, 1972). Third, unsafe behavior was consistently punished either naturally (e.g., a damaged toy), socially (e.g., a parent making a child sit on the steps for 5 minutes--a "time out"), or both. Such vicarious punishment should inhibit the incidence of unsafe behavior (Bandura, 1965; Dubanoski, 1967; Walters & Parke, 1964).

Several storybooks were written because the authors felt that one book could not adequately cover the material and that systematic repetition would help the child. Each book had a slightly different focus.

1--Big Bird Teaches Safe Walking. This book introduces the child to the idea of a book about self, to key words (safe, unsafe, sidewalk, grass, and street), to answering questions about storybook prose, and to the possibility of being rewarded for safe walking.

2--Where to Ride: A Story About A Bigwheel. In the context of riding a bigwheel (a low-slung three wheel toy made of molded plastic, which is popular in the United States), the storybook depicts both natural and social consequences of playing in the street (i.e., the front wheel of the toy is broken off by a passing car, and an adult scolds the child). The storybook also depicts natural and extrinsic rewards for playing safely; that is, the child is shown having fun with playmates, and the child is praised and given a safety button for safe riding. A review of both books 1 and 2 is included in the book.

3--Playing Safely. The protagonist plays with a ball in this story, and the ball is anthropomorphized. The child plays too close to the street, the ball rolls into the street, and the child disobeys mother by going to fetch it. The ball is squashed, and the child is thoroughly scared. The child's shirt is also torn by the passing truck. The mother, hearing the noise, comes outside and makes the child go inside to sit for five minutes (a time out). Subsequently, the child saves money to buy a new ball, which is never allowed to go into the street. The child wears a safety button, then, to show the virtues of safe playing. A review of concepts from the first three books follows the story.

4--Fast Feet. Big Bird, A TV character, provides the central message of this story: "Never put your feet in the street. Only go in the street with a big person holding your hand." At first, the child, hoping to earn a safety button, is depicted playing safely. Subsequently, the child meets Oscar the Grouch (another TV character) on the sidewalk. Oscar's dinner, which had been in a trash can, lies spilled on the street between two parked cars. The child decides to fetch the trash can, but Oscar pulls the child back. Just then one of the cars backs up and smashes the can. The child and Oscar talk about how people in cars cannot see kids.

In the next sequence, the child is walking home and is hailed by friends across the street. The child yields to temptation, and begins to cross the street, and gets stuck in the center of the road between two semi-trailer trucks--and is terrified. The father saves the child from the center of the road, scolds, and makes the child sit on the front steps for five minutes. During this period, the child engages in a number of self-instructions to be safe. After time out, the child plays and is hailed again by friends across the street. This time, however, the child does not yield to temptation. Seeing this, the father praises the child, gives the child a safety button, and offers to take the child across the street.

Both the content and the questions become more complex with each successive storybook, thereby shaping more sophisticated responses from the listening child.

Generalization Probes. In addition to the four storybooks, four loose-leaf binders were prepared, each with 33 pairs of photographs. These were called generalization probes. Each binder held 33 photographs of a child playing safely (e.g., on the sidewalk, a patio, the grass, a driveway, inside a garage) and 33 more of a child playing unsafely (e.g., in the street in a variety of circumstances with a variety of play objects or, in a few cases, in extreme potential hazard--a skateboard about to enter the street). One unsafe and one safe picture appeared on each page, with the order, placement, and pairing randomized within binders. The order of the bound probes (Probe 1, Probe 2, etc.) was randomly determined.

Data Collection

Data on both the independent and dependent variables were collected.

The measured independent variable was the percentage of correct responses to questions asked about the storybook content. Each listening child was asked one or two questions about each page of prose. The child might have been asked to touch some part of the illustration (e.g., the safe place to play) or to respond orally to some who, what, when, why, where, or how question (e.g., "Who can walk alone on the street?" The answer: big people). About 20-30 questions were asked about each storybook.

Two categories of dependent measures were taken: behavioral and conceptual. Behavioral data were collected at the children's homes, and conceptual data at the preschool setting.

Behavioral data. The first author or a research assistant made appointments with the parent(s) to observe their child playing outdoors, usually between five to seven p.m. when the children liked to be outside and the family was at home. The day and time of observation were determined by parental convenience and return of the children from preschool. Schedule conflicts (for the families or observers), children's illnesses, holidays, the weather, and sunset were other considerations. Each observation lasted 25 minutes.

The procedure was the same for all successive observations. Once the child was outdoors, the observer counted and recorded on a data sheet the number of children, including the target child, within a 360 degree view. The observer then set a timer for 25 minutes, entered the starting time on the data sheets, and began watching.

Several child behaviors were recorded:

1. Interaction with a play object was scored if the child touched it or dynamically interacted with it (e.g, playing baseball). Composed on the basis of previous experience observing outdoor play behavior, the data sheet listed 16 categories of play objects: ball, bigwheel, bike, toy cars, frisbee, gliders, kites, pedal cars, pets, roller skates, scooters, skateboards, tricycles, tyke bikes, wagons, and other (which was always specified). Whether the child did or did not interact with a particular play object was also scored during the observation period. Such scoring produced an estimate of the *opportunity* to interact safely with a play object, which could be important in interpreting results. For example, a

decline in the riding of a bigwheel in the street might mean a reduced opportunity to do so--safely or unsafely.

2. The frequency of entering and the duration of playing in the street was measured. Playing in the street was defined: one or both feet touching the street, or playing with some toy that had one or more of its contiguous parts touching the street (e.g., riding a bicycle). If the child entered the street on a bike, the observer checked an appropriate box for that act. If the child simply walked into the street, then the observer checked a box for that. Regardless of the manner of entering the street, the observer started a stopwatch whenever the target child entered or left the street and stopped it when the child left.[5] The stopwatch was not reset during the observation.

3. The child's total time outdoors was also recorded. If the child placed both feet inside an apartment before the timer went off, the clock time was entered on the data sheet. If the child came back outside, that starting time was also entered.

Three categories of parent behavior were recorded, which yielded an estimate of the quantity and quality of parental supervision of children's exposure to traffic hazards:

1. Parent presence outdoors was always noted. It was defined as the parent sticking his or her head out the door or placing one or both feet outdoors. If the parent went outdoors, the observer noted the clock time (to the minute) and wrote it down again when the parent

---

[5] If the parent or caretaker took the child in the street for some purpose (e.g., to go to some other child's apartment), then the child's in-street behavior was not recorded.

went indoors. This process was often repeated several times during an observation, as parents often came out for a few moments to supervise their children.

2. Parental reprimands to children about playing in the street were recorded. (E.G., "I told you not to play in the street"; "Get out of the street"; "Mommy will spank you if you go in the street again".) Physical coercion (e.g., spanking a child or putting a child in time out for playing in the street) was likewise noted.

3. Parental praise for playing safely was also recorded. Complimentary remarks about playing on the sidewalk, the grass, or elsewhere (e.g., "Thank you for playing on the grass"; "you did a good job playing safely"; or "it makes me happy when you don't play in the street"); or tangible rewards for playing safely (e.g., a toy to play with, a chance to hear a storybook read by mommy or daddy, or a special food treat).

When the observation period ended with the ringing of the timer, the observer noted the final stop time for both the child (if outdoors) and parent (if outdoors). Then, the observer again counted and recorded the number of children playing outdoors.[6]

A resident of the apartment complex was hired to conduct the outdoor observations. She professed only a slight acquaintance with the target families. The first author served as the reliability and relief observer.

---

[6]All time functions scored by the observer relied on a single instrument: a Casio Melody-80 (mode switch set on CAL--to eliminate tones emitted on striking keys), which is a liquid-crystal display stopwatch, alarm clock, and calculator, manufactured by Casio Computer Co., Limited, Japan.

Appendix A contains a sample data sheet for the outdoor observations.

Reliability checks were made 12 times on the outdoor observations, at least twice per child. Standing four to ten feet away from the primary observer, the reliability observer used the same recording procedures. Two identical, synchronized stopwatch/alarm clocks were used by the primary and reliability observers; the instruments were synchronized once and were within one second two months later.

Estimates of interobserver agreement on only the occurrence of the various behaviors were calculated, since the observed behaviors tended to occur infrequently, such that estimates of nonoccurrence reliability would be quite high. Occurrence reliability was computed one of two ways.

First, estimates of interobserver reliability per observation were computed as follows:

$$\frac{\text{The smaller number of occurrences or shorter duration}}{\text{The larger number of occurrences or longer duration}} \times 100 = \text{Percentage of Agreement}$$

(Time measures were converted to their decimal equivalents before computing reliability.) Subsequently, average reliability across sessions was computed. These calculations yielded estimates of interobserver reliability on the occurrence of some behaviors monitored outdoors; these are shown in Table 1. Except running or walking into the street, reliability estimates were quite high.

Second, some estimates of interobserver reliabilty were not computed on several sessions and reported as an average across sessions, because the behaviors in question occurred during only one observation or occurred only a few times in a few sessions. In the first instance, the reporting of an

Table 1

Estimates of Average Interobserver Agreement

For Certain Observed Behaviors

BEHAVIOR	MEAN PERCENTAGE OF AGREEMENT
-Time in the street	97%
-Frequency of times in the street	93%
-Total time playing outdoors	99%
-Parent time outdoors	94%
-Average number of children outdoors	96%
-Running or walking into the street	75%
-Riding bigwheels into the street	96%

average percentage of agreement would be meaningless; and in the second, one poor observation would seriously skew the average. Accordingly, the same formula was used on the data from observations in which the behavior was scored, but no averages across sessions were computed. Table 2 presents estimates of interobserver reliability for low-rate observed behaviors.

Neither the primary observer nor the reliability observer participated in the training of the children, because the presence of the trainer might be a discriminative stimulus to engage in safe behavior--thereby reducing the generality and validity of any findings. It is important to note that neither the parents nor the children were informed about the particular behaviors being observed, and the children paid little heed to the observers who were unresponsive to the children during observations.

Conceptual data. Utilizing the generalization probes, the investigators measured the children's understanding of safe and unsafe by showing each child successive generalization probes. On seeing one pair of pictures, the children were asked by the trainer to "touch the picture of the child playing safely." They were not told about the correctness of their choice, but they were praised for their cooperation. Later, however, Abby was reinforced for correct responses, because a post probe revealed no effect of storybooks and unreinforced probes may function as stimuli (S^{Δ}s) occasioning extinction. Yet direct reinforcement initially would have muddied any conclusions about the effects of the storybooks on concept acquisition. The trainer noted each response by the child on a data sheet devised for each probe.

Table 2

Reliability Estimates of Very Low-Rate Behaviors

BEHAVIOR OBSERVED	RELIABILITY ESTIMATES BY SESSION
-Riding tyke bikes in the street	(1/1) = 100%
-Roller skating in the street	(1/1) = 100%
-Playing with ball in the street	(1/1) = 100%
-Parent reprimands to child about playing in the street	(3/5) = 60%, (10/12) = 83%, (0/1) = 0.0%

*Note: the numbers inside the parentheses denote frequency of observed behavior by each observer by session.

Generalization probes were not given frequently, because Horner and Baer (1978) have noted that some repeated measures conducted in multiple-baseline designs are reactive. The authors judged that the long, boring, and unreinforced generalization probes would be just such reactive measures if given frequently. The authors also predicted that many exposures to this ancillary measure might have adversely affected children's reactions to the storybooks and to the trainer.

Experimental Procedures

Each child experienced two conditions during the study: baseline and storybooks. Baseline preceded exposure to the storybooks about traffic safety.

During baseline, children and their parents were repeatedly observed outdoors at home. The trainer also gave one generalization probe to each child. Neither the children nor the parents received any instruction about traffic safety from persons participating in the conduct of the study during the baseline condition.

The experimental intervention consisted entirely of repeated exposure to the storybooks. During the storybook condition, the trainer (a former public-school teacher hired for the study) escorted each child to the experimental training setting. After settling the child in a chair facing the storybook, the trainer told the child that he or she was going to hear a story that day. The trainer gave the name of the book and told the child that she (the trainer) would be asking questions as she read the story. Then, she began reading. Whenever the child responded to one of those

questions, the trainer noted that response on a data sheet prepared just for that storybook and descriptively praised the child's correct responses. If the child missed an answer, the trainer asked the question again. If the child still missed the question, then the trainer modeled the correct response, asked the child to repeat it, and praised the child for correct imitation. At the end of the session, the child earned a Big Bird Safety Button, which was depicted in the storybooks, or some other safety button which displayed a Sesame Street character (but did not appear in the storybooks). After earning the button, the trainer escorted the child back to the classroom.

During the storybook condition, conceptual and behavioral data were collected. All children except Abby received one generalization probe; she received six: four unreinforced, and two reinforced. Children and their parents were repeatedly observed outdoors at home. The parents were not informed about the timing of intervention or the exact behavioral objective of the intervention (i.e., reducing the frequency and duration of children's play in the street).[7] Informing the parents of these details would have confounded any conclusions about the effects of the storybooks. . . the ostensible purpose of the study.

Experimental Design

The effects of the storybooks were evaluated experimentally through a multiple-baseline design across subjects, an experimental design that has been described extensively (e.g., Baer, Wolf, & Risley, 1968; Kratochwill, 1978; and Hersen & Barlow, 1976). The multiple-baseline design was chosen

---

[7]These were conditions to which the parents had agreed when they signed the letter of informed consent.

for both practical and scientific reasons. First, the number of subjects required to demonstrate experimental control is much smaller than for comparable group designs (Kazdin, 1980, pp. 104-105), thereby minimizing the expense of the study. Second, differences (or lack thereof) in outdoor behavior between conditions as measured once per child (a posttests-only group design) or twice per child (pre and posttests group design) might have been an artifact of intrasubject variability: preliminary observations of children playing outdoors had revealed considerable intrasubject variability, such that repeated measures (like those found in the multiple-baseline design) were necessary to assure accurate and representative data about behavior recorded during baseline and intervention--especially if the effects of the intervention were transient. Third, a spectrum of other variables is known or thought to affect the pedestrian-related behaviors of children; these variables included maturation, exposure to school, number of peers interacting with the target child outdoors, play objects available to the target child, daily weather conditions, month of the year, and time of sunset. A group or time-series design with an intervention fixed in time confounds the intervention with "time of testing" variables, which may be as or more powerful than the intervention itself. The multiple-baseline design ameliorates this difficulty through sequential interventions across subjects at different times (Kazdin, 1980, p. 177). Fourth, a well-constructed group design vitiates any conclusions about individual behavior (Hersen & Barlow, 1976; Sidman, 1960). Thus, some children hearing the storybooks might have shown improvements while others might have become much worse, yet the central tendency as described by statistical operations might

have shown an overall improvement. If a program were then widely implemented on the basis of the descriptive statistics, that program might have disastrous consequences for a significant subgroup of children. A multiple-baseline design, however, allows precise knowledge about individual effects, and generality of effects to groups may be inferred to the degree to which systematic replications (parallel to a factorial design but with greater economy--Hersen & Barlow, 1976, p. 57) are achieved across heterogeneous subjects, training settings, intervention agents, and so forth (which is similar to the logical process that is used to describe the generality results from most group designs).

RESULTS

Figure 2 shows the number of times each child entered the street, experienced as rate per hour. The mean number of times entering the street during baseline for each child was: Cal, 11.0; Abby, 14.9; Mac, 8.1; and Al, 16.4. During the storybook condition, the mean number of times entering the street declined to: Cal,1.6; Abby,8.1; Mac, 5.9 and Al,9.5. Linear regressions suggest an upward baseline trend for Abby and Mac, a stable one for Al, and a downward one for Cal.

Figure 3 shows the average percentage of time spent in the street during baseline observation for each child was: Cal, 5%; Abby 16%; Mac, 6%; and Al, 21%. During the storybook condition, the average percentage of time spent in the street declined to: Cal, 0.33%; Abby, 6%; Mac, 3%; and Al, 6%.

FIGURE 2

CHILDREN'S RATE OF ENTERING THE STREET

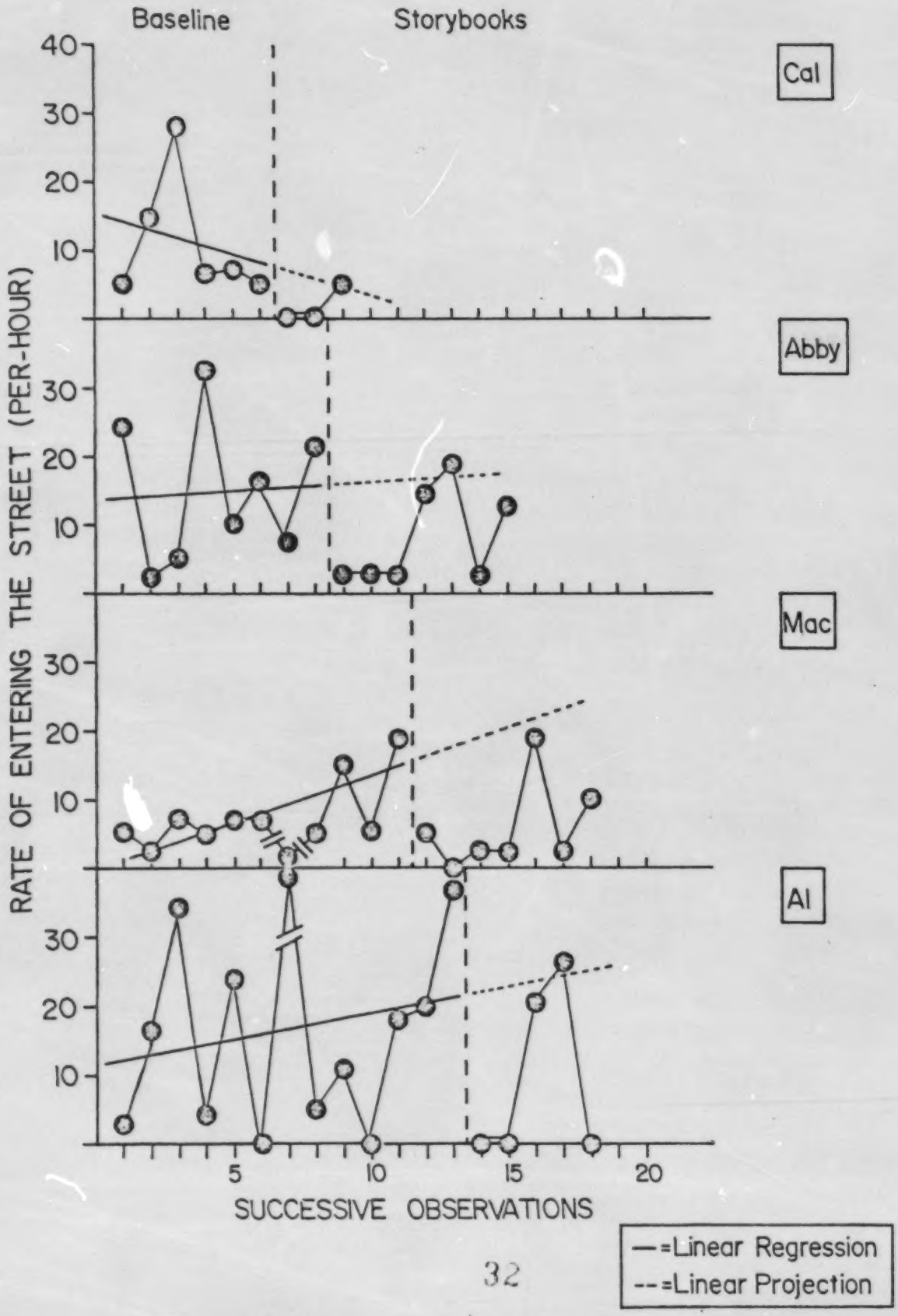
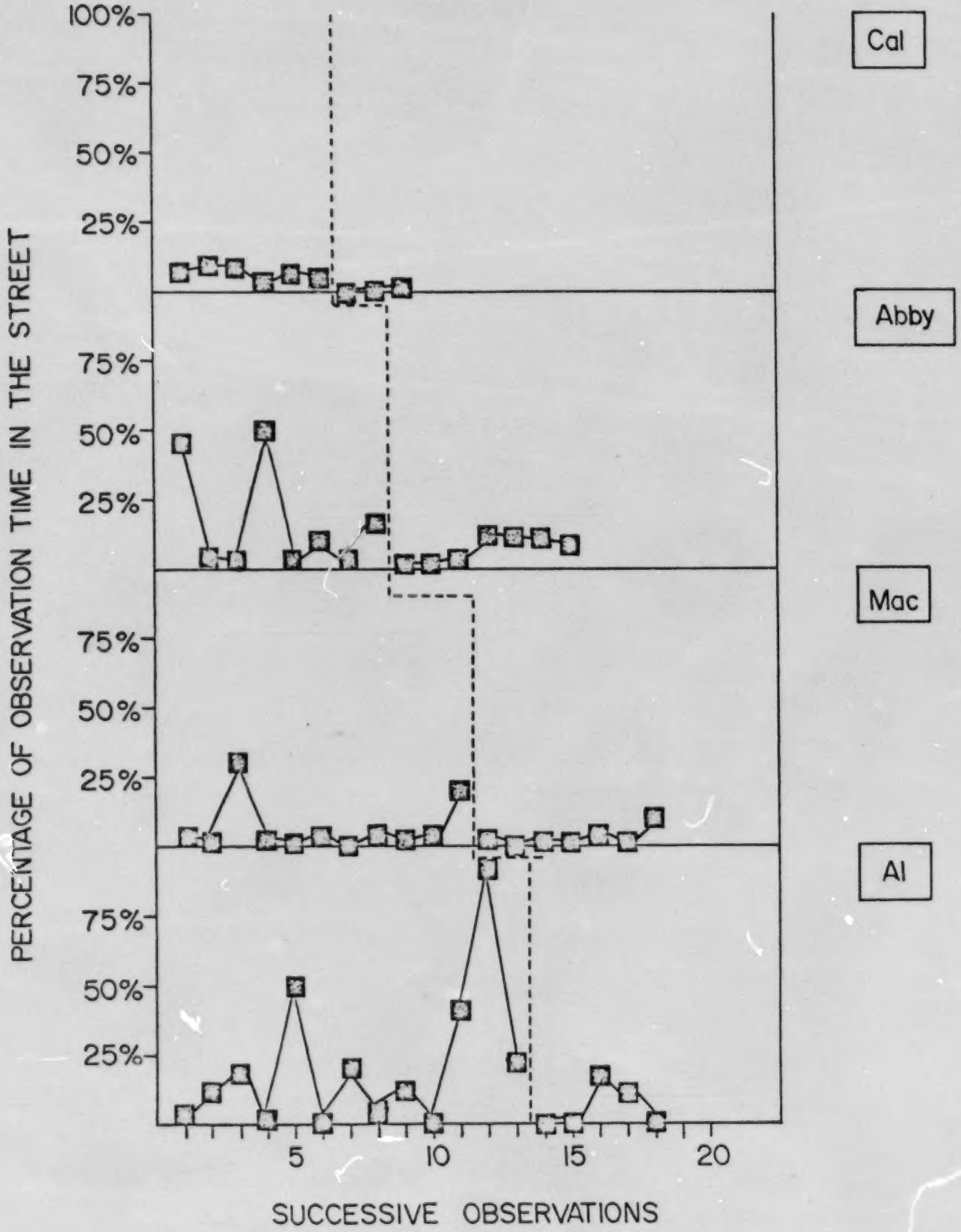


FIGURE 3

DURATION OF CHILDREN'S PLAY IN THE STREET

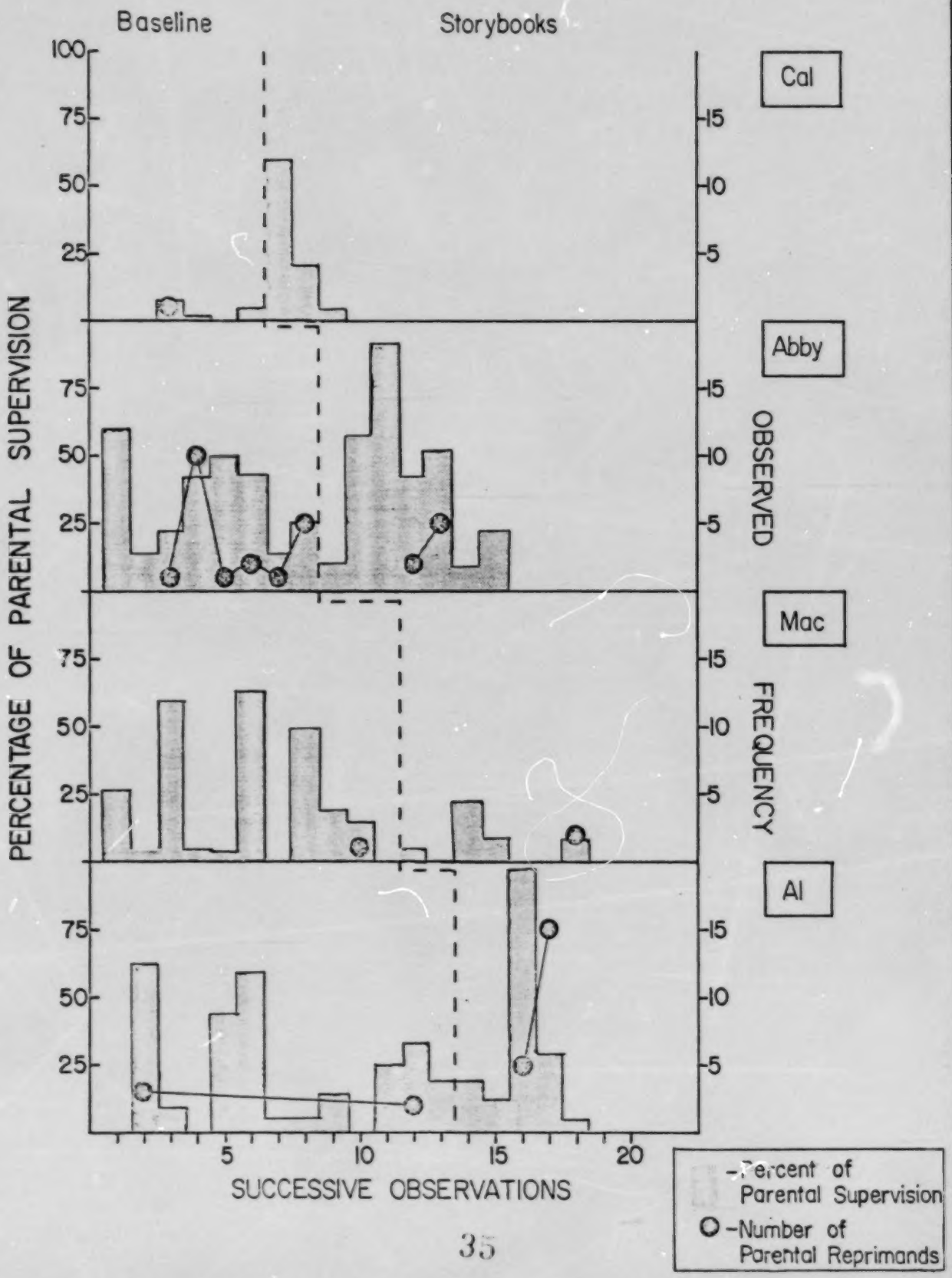


These changes in mean scores, however, belie the trends in the data. Inspection reveals that the effects of the storybooks were largely transient; exposure to the storybooks immediately depressed both the frequency of entering the street and the duration of play there, but the behaviors tended to return to baseline levels after several observations. In sum, storybooks apparently have an appropriate, but short-lived effect.

Figure 4 displays the percentage of time during the observations that the parents spend supervising their children, and the number of times that parents reprimanded their children for playing in the street. During baseline, each child was supervised different amounts of time: Cal, $\bar{X}$ = 2%; Abby, $\bar{X}$ = 33%; Mac, $\bar{X}$ = 17 %; and Al, $\bar{X}$ = 21%. During the storybook condition, the amount of supervision increased for Cal (+ 25%) and Al (+ 18%), stayed about the same for Abby (+ 7%), and decreased for Mac (- 10%). The black dots indicate rates of parent reprimands; it is apparent that there were considerable differences in the number of reprimands to each child. Cal and Mac received one and three reprimands, respectively. Abby was generally reprimanded at least once during an observation and sometimes as many as ten times. Al was reprimanded five times during baseline and twenty times during storybooks. Figure 4 also shows that the children were monitored and reprimanded quite differently by their parents, and it shows that there were no consistent changes in these patterns from baseline to the storybook condition. Correlational analyses of the data depicted in Figure 4 are shown in Table 3. The correlation between reprimands and Abby's frequency of entering the street was +.95--a highly significant correlation. (Correlations on the reprimands received by other children

FIGURE 4

AMOUNT OF PARENT-SUPERVISION
AND NUMBER OF PARENT REPRIMANDS



were not computed because of infrequent occurrence of reprimands across observations.) Correlations between amount of parent supervision and frequency of in-street behavior were computed, and only one was significant; Abby's at +.85.

There were no recorded instances of parents praising or rewarding their children for safe behavior.

Table 4 contains data on the number of children playing outdoors during each observation of each child. The number playing during the observations of Mac and Al remained constant across the conditions, although there were day-to-day variations. The number of children outdoors when Abby was observed declined slightly and steadily over the course of the study, as evidenced by the significant correlation between successive observations and number of children. Coincident with the storybook intervention, the average number of children outdoors when Cal was observed declined by three, although the correlation with time was nonsignificant. These data also reveal that only one child was observed to be playing outdoors alone. . .Al.

Table 5 presents data on the coefficients of correlation between the presence of peers and the children's frequency of entering the street. In only one case was the correlation significant and that was for Cal, for whom the correlation was +.68. Apparently, the presence of peers had no wide-spread effect.

In calculating 13 separate correlations using a .05 alpha level, one would expect to find one significant correlation by chance alone. Four

Table 3

Coefficient of Correlation Between Parent Reprimands and Frequency of In-Street Behavior and Coefficient of Correlation Between Amount of Parent Supervision and In-Street Behavior

Parent Reprimands to:	Coefficient of Correlation*
-Cal	(insufficient data)
-Abby	r = +.95, P< .01
-Mac	(insufficient data)
-Al	(insufficient data)
Amount of Parent Supervision of:	
-Cal	r = -.48, NS
-Abby	r = +.85, P<.01
-Mac	r = -.13, NS
-Al	r = +.13, NS

*Two-tailed test, Wike (1971), p.246.

NS = not statistical significant, using .05 as the alpha level.

Table 4

Number of Children Outdoors Playing During Each Observation and Correlation Between Number of Children Observed and Order of Observation

	SUCCESSIVE OBSERVATIONS (Baseline)											(Storybooks)							*Coefficient of Correlation*
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
CHILD:																			
-Cal	6*	12	11	6	5	4	2	9	2	-	-	-	-	-	-	-	-	-	$r = -.56$ (NS)
-Abby	5	8	7	5	3	5	5	2	6	3	2	3	2	3	3	-	-	-	$r = -.70$ (<.01)‡
-Mac	7	9	5	8	9	3	5	4	6	6	5	10	5	4	6	10	4	7	$r = -.009$ (NS)
-Al	3	6	2	2	2	2	8	4	2	2	4	3	1	1	1	2	5	2	$r = -.25$ (NS)

*Average number of children observed, which was computed as follows:

$$\frac{\text{1st Count of Children Outdoors + 2nd Count of Children Outdoors}}{2}$$

‡Two-tailed test, Wike (1971), p. 246.

NS = not statistical significant, using .05 as the alpha level.

Table 5

Coefficient of Correlation Between the Presence of Peers and the Frequency of Entering the Street

Child	Coefficient
-Cal	r = +.68 (p< .05)*
-Abby	r = -.20 (NS)
-Mac	r = +.16 (NS)
-Al	r = +.43 (NS)

*Two-tailed test, Wike (1971), p. 246.

NS = not statistically significant, using the .05 alpha level.

significant correlations were found, however.

Table 6 summarizes the types of in-street behavior and the frequency with which certain objects were played. Walking and running were the most frequent ways of entering the street, and bigwheels were the most frequently used object for entering. Some toys were seldom played with, but, when used, were almost always played with in the street: balls, roller skates, and wagons. The other toys with which the children played were seldom played with in the street.

Table 7 displays children's performance on the generalization probes. Baseline data indicate that Cal and Mac could recognize safe outdoor play behavior, whereas Abby and Al could not. Both Cal and Mac showed modest gains after training (about 10%), but Al had a very large gain (55%). Abby was able to recognize safe behavior only after being reinforced for her correct responses.

Table 8 are data on children's answers to questions posed in the storybooks over successive readings. Answers are expressed as percentages of correct responses. All children except Abby usually scored 75% of better. Children apparently found the questions in Books 1 and 2 easier to answer than those in Books 3 and 4.

Table 6

Non-Play Object and Play-Object Behaviors

Associated with Entering the Street

Behavior	Number of Observations With Which Object Played	Number of Times Entering Street
Walking & Running	NA	155
Riding a Bigwheel	29	42
Playing with a ball	5	5
Riding a bike	8	6
Playing with small cars or trucks	12	0
Playing with pets	1	0
Roller skating	6	13
Riding a tyke bike	1	1
Riding a wagon	5	4
Other toys	33	3

NA = not applicable

Table 7

Children's Performance on the Generalization Probes

CHILD	(Basline)	SUCCESSIVE GENERALIZATION PROBES (Storybooks)					
	1	2	3	4	5	6	7
-Cal	87%	97%	100%	-	-	-	-
-Abby	43%	48%	58%(+)	62%	82%(+)	82%	69%
-Mac	93%	97%	-	-	-	-	-
-Al	42%	97%	-	-	-	-	-

(+) indicates that the child's responses were directly praised.

Table 8

Percentage of Correct Answers by Children

to Questions Posed in Storybooks

	SUCCESSIVE STORYBOOK READINGS									
CHILD	1	2	3	4	5	6	7	8	9	10
-Cal	88%	100%	85%	92%	100%	100%	89%	100%	96%	-
	(1)*	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(3)	
-Abby	58%	65%	28%	58%	44%	71%	85%	32%	74%	65%
	(1)	(2)	(3)	(1)	(3)	(2)	(1)	(4)	(3)	(4)
-Mac	92%	100%	85%	100%	97%	-	-	-	-	-
	(1)	(2)	(3)	(2)	(4)					
-Al	62%	81%	74%	85%	-	-	-	-	-	-
	(1)	(2)	(3)	(4)						

*Number of the storybook in parentheses.

DISCUSSION

The study revealed that specially designed storybooks had a temporary effect on the outdoor play behavior of four young children. The effects were more pronounced on the number of times the children entered the street than on the percentage of time they played there. Intrasubject correlational analyses failed to reveal consistent, significant covariants (e.g., amount of parental supervision or peer presence) across children that might account for changes between baseline and the reading of the storybooks. The effects of the storybooks on the children's concepts of safe and unsafe outdoor play were variable and unclear, partly because two of the four children performed at near ceiling level during baseline probes. Tradition tells us that storybooks are delightful to young children; the present experiment tells us that they are sometimes instructive.

Several points need to be made about methodology. These points involve measurement and design.

First, interobserver agreement was not as high for some behaviors as for others. Running and walking into the street (combined) had an average occurrence reliability of 75%. This lower-than-anticipated reliability appeared to result from confusion about other categories. For example, if a child were throwing dirt into the road (which happened several times with Al and Abby) and subsequently darted into the road, one observer might have recorded an "Other" in-street behavior while the reliability observer recorded the child as running. This kind of confusion happened not only with the "Other" category but also with specific play-object categories. This con-

fusion might be cleared up in the future by changing the definitions, such that the child has to be in physical contact with the play object at the time of entering the street. This change, however, would lose sensitivity to various children's games, etc. Alternatively, one might ignore the various subcategories and stick with overall measures, thereby solving these reliability problems. Although some reliabilities on individual in-street behaviors were not as high as one might hope, the overall occurrence reliability on entering the street was very high (93%).

Reliability estimates on parent reprimands were a disappointment, especially considering the magnitude and significance of the correlation between parent reprimands and Abby's in-street behavior. The poor reliability on reprimands probably resulted from two factors. (1) Reprimands were infrequent, and observers had little chance (over 12 reliability checks) to see them and refine their tactics. (2) There were some serious impediments to observer consensus. All recorded instances of reprimands were oral (no spankings or time outs), and these took place outdoors. The fact that the observers often stood ten feet apart (so as not to cue each other) made it difficult for both observers to see the parent's mouth or hear him or her. The surrounding outdoor noises (wind, traffic, factory, and other children) only made matters worse. More reliable data on parent reprimands might be collected through additional training sessions and/or reliability checks. If that strategy failed, one might have the children wear small FM wireless microphones, but such technological innovations may introduce their own problems.

If either method proved effective, one might choose a different means

of calculating reliability. The reported method of computing reliability is sensitive to both consistency and numerical agreement between observers. One might choose to calculate coefficients of correlation between the two observers, a calculation that is mainly sensitive to the consistency between observers. Such a method might be appropriate in cases such as these, when observers might be consistently but differentially sensitive to the behaviors being recorded. A high positive correlation between the observers would indicate that they were systematically viewing the same thing but differentially recording it (for whatever reason); a zero-order correlation would indicate no consistency between observers and would underscore their unreliability. A high negative correlation would suggest observers had private definitions about the studied events. In the case of the present study, the correlation (+.999) indicates that the observers were very consistent in their observation of parent reprimands, although they recorded different frequencies. Accordingly, one may have greater confidence in the data on parent reprimands than if the correlation had approached zero or had been negative.

The current data-collection system was not sensitive to the contingent relationship between reprimands and children's in-street behavior, except in a very general way. An interval-based code would be more sensitive to contingent relationships and enable the researcher to study other temporal relationships (if any) associated with children's play in the street. Future research on pedestrian safety and preschoolers might enrich our knowledge if an interval code (e.g., 10 seconds) were used.

Despite some of the aforementioned difficulties, the data collection

system has added to the repertoire of traffic safety research. The study demonstrates that home-based data on pedestrian-related behavior are possible to obtain. Previous research on children's pedestrian behaviors have focused on coming and going to school (Van Der Molen, 1977), when few accidents occur.

The results of this study reinforce the decision to use a multiple-baseline design. An inspection of Figure 2 reveals both intra- and inter-subject variability, which might emasculate some group designs. For example, Figure 2 shows that Al's baseline rate of in-street behavior varied from zero to sixteen between two successive observations. Thus, a single pre- and posttest measure might have made storybooks seem extraordinarily effective or dismally ineffective. The transient nature of the effects of storybooks underscores the need for repeated measures, a characteristic of multiple-baseline designs. A single posttest measure, depending on the timing of such measurement, might have yielded an erroneous conclusion about the magnitude and the durability of the effects of storybooks. Indeed, the study at hand offers a caveat on experimental design to researchers interested in safety education.

One question stands out: Why were the effects of storybooks short-lived? Other studies involving imitation have shown durable effects of 30 days (e.g., Jakibchuk & Smeriglio, 1976). So why not this study? There are at least three possible reasons, taken together or separately. Consider those reasons. (a) Maintenance of the effects was sabotaged by parental statements and/or actions following safe and unsafe play; (b) playing in the street is "intrinsically" reinforcing; and (c) the symbolic model was not sufficiently powerful.

Recall the correlation between parental reprimands and the frequency with which Abby entered the street; it was +.95, an extraordinarily high correlation that accounted for 90 percent of the variance. That correlation describes neither tone of the reprimands nor the temporal relationship to Abby's behavior (reprimands could have followed or preceded the probability of going into the street). Anecdotally, the tone and content of parent reprimands resembled parent attention to inappropriate child behavior, a phenomenon that has been widely reported in the behaviorally based parent-training literature (e.g., Green, Forehand, & McMahon, 1979; Kelly, Embry, & Baer, 1979). For example, note this amalgam of reprimands: "Oh, (child's name), Mommy told you not to play in the street. Cars might run over you. You wouldn't want that." Picking the child up and setting the child down on the sidewalk, the parent continues: "Mommy will put you here to play. I don't want you to get hurt." Within a few moments, the child typically runs right back into the street, and the parent repeats some variant of the above.

The parental reprimands seldom, if ever, were truly punishing; rather, parental reprimands appeared to possess the topographic and functional characteristics of a reinforcer. The significance of this is magnified when it is recalled that there were no recorded spankings or time outs for playing in the street and that there were no recorded instances of praise for safe behavior. Thus, parents were either indifferent to their children's play in the street or were unintentionally encouraging it. (Of course, the opposite could be true; that is, reprimands might have been "evoked" by going in the street).

This reinforcing property of parent reprimands can be seen, if one compares children's behavior and parental reprimands point-by-point. Though Cal was reprimanded only once, his highest rate of entering the street occurred when he was reprimanded by his mother. Abby's data clearly evidence the trend, as verified by the high correlation. Mac's data seem internally contradictory on this point, although the day following a parent reprimand was the worst day during baseline, and parent reprimands occurred on his second worst day during the storybooks. In Al's case, the increase in parent reprimands exactly parallel the increase in his unsafe behavior.

It seems likely that children were unwittingly reinforced by their parents for playing in the street and were never reinforced for safe play. The effects of such parental mismanagement have been well documented and have a sound theoretical basis.

Nevertheless, the authors can report that if a parent actually punishes unsafe behavior and praises safe behavior, the child will enter the street much less frequently. The case in point involved Cal and his father (whose data were not shown). Cal's parents were divorced, and Cal spent half of each week with his father, where his outdoor behavior was observed, too. During the second baseline observation, Cal's father started a program of time outs (of about 5 minutes) for entering the street. He also began praising Cal for safe playing. After one more observation, Cal's in-street play fell to almost zero and continued that way as long as he was at his father's. This was an impressive event, because Cal typically had entered the street about 15 times per observation and played there about

50% of the time at his father's. Interestingly, there was little or no generalization of safe behavior to play at his mother's house.

Unlike any of the other parents, Cal's mother and father had been enrolled in a parent-training program with which the first author is associated. Both parents had a long history of serious child-rearing problems and an open file with child-protective services. The research data from the home-based program revealed that the father had been quite successful in changing his behavior toward the child, while the mother had not--despite very intensive efforts. The investigators suspect that the presence of the first author (who was closely attached to the parent-training program) "triggered" the father to use time out and praise, techniques that he had been taught. Indeed, the father's comments suggested as much.

It is quite unlikely that this cueing phenomenon could have occurred with the other parents. Research by Johnson and Bolstad (1975) and Johnson and Lobitz (1976) shows that neither obtrusive observation nor explicit instruction to "solve the problem" seriously affect the behavior of naive parents. However, research by L. Embry et al. (1979) shows that group parent-training plus at-home feedback by a therapist does result in dramatic changes in parent-child interactions. Cal's father had successfully completed such a training program, but the mother had not. None of the other families had <u>any</u> exposure to the parent program.

Playing in the street may be an "intrinsically" reinforcing event. The wide expanse of hard surface may be irresistible when a child is playing

with a wheeled toy. Indeed, Table 6 reveals that such toys were invariably played with in the street. A perverse reinforcer may operate for the children, too. The observers noted that children occasionally played a version of the "chicken" game with passing cars: running to and fro across the path of the cars. This game seems to exact a lot of peer attention and attention from drivers in the same vein as parent reprimands (which were discussed previously as possible reinforcers). If playing in the street is reinforcing to the children, then it would be unlikely that any symbolic model would be powerful to inhibit playing in the street for any appreciable length of time. Thus, the only direct application of external contingencies (e.g., praise and time outs) could be expected to overcome the naturally reinforcing properties of playing in the street.

Baer and Wolf (1970) have promoted the notion of "behavior traps," in which good behavior is maintained by a community of natural reinforcers. When such traps exist, modeling techniques can be quite effective in producing long-term change (e.g., Keller & Carlson, 1974). Given the preceding discussion of reinforcers, it seems likely that the trap in this case caught unsafe, not safe behaviors.

Special storybooks were created for this experiment, with careful attention to the literature on imitation and inhibition. Even so, the symbolic models presented in those storybooks might not have been effective enough. On further reflection, the authors can recommend some possible additional steps:

1. When children are outdoors at the preschool or daycare center and before they have been exposed to the storybook models, teachers might award "Big Bird Safety Buttons" to them for "safe" behavior. If the observer and the model have experienced similar reinforcement histories, then imitation will be facilitated (Bussey & Perry, 1976; Bryan, Redfield, & Mader, 1971).

2. Before children see and hear the storybooks, they might be shown puppets of some of the Sesame Street characters and a puppet or the protagonist depicted in the storybooks. In a variant of the game of "Simon Says," the puppets would copy the target child's behavior. Then, the child would be asked to copy the puppets' behavior, and the teacher would vigorously reinforce the child for doing so. After that game, the teacher would read the storybooks. There is evidence that being copied by a model is very reinforcing for the observing child and that being copied will subsequently enhance the child's own imitation of the model (Kauffman, Kneedler, Gamache, Hallahan, & Ball, 1977).

[Fred Rogers, of the TV show, "Mr. Roger's Neighborhood," suggests that puppets should be introduced as follows" (1) talk about the puppet, (2) talk to the puppet, and (3) have the puppet talk.[8]]

3. When the storyboosk are being read, the teacher might use one of the previously mentioned puppets to give contingent rewards

---

[8] A comment from an interview with Fred Rogers on a radio program ("Options in Education") on Mr. Roger's Neighborhood," which was produced and broadcast by National Public Radio, Washington, D. C., 20202.

for correct answers to storybook questions, because "powerful" models (i.e., ones who dispense reinforcers) are more effective in promoting imitation (Grusec, 1972).

4. The storybooks might be altered to include more episodes of the protagonist resisting temptation and being rewarded for it (Perry, Bussey, & Perry, 1975).

5. The teacher should instruct the child to copy Big Bird or the protagonist at home and be a safe walker (Steinmann, 1970).

6. After leading the children through the storybooks, parents or teachers should make sure that children wear the safety buttons outside. The buttons should be clearly visible to the child (i.e., affixed to the pant's leg, or stuck on the shoe, or stamped on the child's hand). By wearing the button away from the training environment, the child is exposed to a stimulus from the training environment. Thus, the button might function as a discriminative stimulus, thereby occasioning safer behavior (Lupercio & Ribes, 1976).

7. Children who play together at home and attend the same school might be trained as pairs, since there is some evidence that the presence of a co-observer can increase non-reinforced imitation (Hicks, 1968).

8. Playing on the sidewalk or grass might be made a more valued activity, by contrast, if an androgynous character (not the protagonist) were shown getting punished for unsafe behavior and that model was a disliked or unesteemed playmate (cf. Russell, Wilson, & Jenkins, 1976). The teacher or parent might ask the target child who he or she did not like as a playmate and use that name

for the unsafe model.

These additions could be introduced singly or in combination, and they offer many opportunities for future research.

A possibility exists that "booster" readings of the storybooks might enhance their effects. The possibility is attractive but not clearly probable, assuming imitation is one of the processes underlying the effects of the storybooks. If parents inadvertently reward unsafe behavior and playing in the street is naturally reinforcing, an extinction condition exists for imitation of safe behavior. More readings will not change the prevailing contingencies and, therefore, will unlikely prolong safe behavior. It is possible that readings by parents, however, might have more impact; the storybooks might change their use of rewards. The questions of the number and the who of the readings deserves further inquiry.

Additional follow-up data would have been useful, especially in the case of Cal. Unfortunately, circumstances did not permit such follow-up. In Cal's case, for example, he caught chicken pox and later went away for two weeks on a trip. On returning, he no longer ventured outside to play, because it was dark and cold by the time he got home from school. Similar difficulties beset the observation of the other children. (Persons wishing to pursue this line of research are advised to start it during the Spring, when the days are becoming longer and warmer.)

The present study offers evidence for the effects of storybooks on three children, and possibly on four. But what about the generalization

of effects to other children, other home settings, other teachers, and other parents? That questions, which determines the social significance of the results of the study, has a logical response.

1. The children varied in age, language skills, sex (more boys, however, who are higher risks for such accidents), and academic ability; and yet, the results were similar for all.

2. The nature of the family environment (e.g., parent's education, marital and working status, and number of siblings) varied, and some of those variations have been linked to differential probabilities for pedestrian accidents (Backett & Johnston, 1959). Nevertheless, the results of families were similar. The physical ecology of the home observations may be representative of the settings in which children are more likely to be the victims of pedestrian-vehicle accidents (Read, 1969). The major exceptions to this ecological variable may be cities like New York, where multiple-family dwellings tend to be vertical, with little open space except parks. Some U.S. suburbs, with mostly single-family dwellings, may also differ in that they lack sidewalks. Whether these variations would affect the results is unknown; but it is important to note that the settings depicted in the storybooks were quite varied (suburban to apartment complex to row houses), and the storybooks affected the behavior of children who lived in but one of those settings.

3. Different teachers might achieve different results, especially if they exhibited differences in the extent of nurturance. The

storybooks themselves might minimize some of that difference, because Books 1, 2, and 3 each had a list of 20 praise words from which the trainer drew to praise the child for correct responses; Book 4 listed two praise words with each question. The trainer read the stories with moderate dramatic emphasis, which likely characterizes most early childhood educators. A more dramatic reading might be more effective, and a less dramatic reading might be less effective. The authors, given the available evidence, conclude that while generalization of the results across other children, settings, and teachers is not known, based on this study, the indications for it are good. The question of generalization awaits answer through systematic replication of the study.

Another kind of generalization merits discussion. Someone interested in a different aspect of child behavior might ask: Could the techniques used in the design and implementation of the storybooks on pedestrian safety be applied to other problems? The answer seems to be yes. First, there is nothing in the formal features of the storybooks that applies uniquely to pedestrian behavior. Second, other research using storybooks as part of an intervention package supports the use of these formal features applied to other problems (Issacs, Note 5--teaching children to praise their siblings; and Kelly, Embry L., & Baer, 1979--teaching a child to cooperate with his parents). Whether, however, the features used in this research on storybooks represent the best combination is unknown.

The results of the present study set the stage for further research, either basic or applied research, which often intermingle.

To the authors' knowledge, this experiment is the first to report changes in children's behavior in an everyday environment as a product of exposure to storybooks alone. But we repeat: What are the formal features of children's storybooks that effect behavior change, and what combination(s) of those features are most effective in producing that change? Artistic or literary judgments may no longer be the only criteria for the creation of storybooks.

The social significance of the problem addressed herein mandates further applied research. It might follow two courses. First, systematic replications with different children, in other settings, and with other teachers might be conducted. Such replications would permit more confident deductions about the generality of results, thereby signalling the desirability of broader use of the storybooks to help solve a tragic problem.

Second, a broader study might be conducted in which storybooks were one component in an intervention package. It seems clear that parents' use of praise and punishment must be altered, if there are to be long-term changes in children's play in streets and a correlated reduction in pedestrian-vehicle accidents. The storybooks do not change parental behavior, although they do change children's behavior for a brief period of time. Thus, an intervention package might be created to change parental behavior in conjunction with the use of the storybooks. The

storybooks would provide the change in behavior for the parents to reinforce, and the parents could provide the contingencies (abetted by a preschool or day care center) to maintain the behavior change. The broader study will be the next conducted by the authors.

A favorable evaluation of the effects of further experimentation could lead to reduction of the trauma and suffering currently experienced by young children and their families. The results of this study offer hope for achieving that goal.

Reference Notes

1. Wahler, R. F. The insular mother: her problems in parent-child treatment. An invited address at the 5th annual convention of the Association for Behavior Analysis, Dearborn, Michigan, June 1979.

2. Embry, L. H. Parent education programs at home and in the community. Paper presented at the joint meeting of Germans and Americans on the Safety of Children in Traffic, Washington, D. C., November 18, 1979.

3. Boroughs, M. C. The stimulation of verbal behavior in culturally disadvantaged three-year olds. East Lansing, Michigan: Michigan State University, 1970. (ERIC Document Reproduction Service No. 055 667).

4. Embry, D. D. Can storybooks really change children's behavior: A research report. In J. Lutzker (Chair), Children's storybooks as mediators of behavior change. A symposium to be presented at the annual meeting of the Association for Behavior Analysis, Dearborn, Michigan, May 1980.

5. Issacs, C. New Therapists: preschool-age children in the home. In J. Lutzker (Chair), Children's Storybooks as Mediators of Behavior Change. A symposium to be presented at the meeting of the Association for Behavior Analysis, Dearborn, Michigan, May 1980.

References

Accident Facts. Chicago, Illinois: National Safety Council, 1977.

Avery, G. C. The capacity of young children to cope with the traffic system: Aerial view. New South Wales: Traffic Accident Research Unit, Department of Motor Transport, June 1974.

Backett, E., & Johnston, A. Social patterns of road accidents to children: Some characteristics of vulnerable families. British Medical Journal, 1959, 1, 409-413.

Baer, D. M., and Wolf, M. M. The entry into natural communities of reinforcement. In R. Ulrich, T. Stachnik & J. Mabry (Eds.), Control of human behavior, Volume II. New York: Scott, Foresman, & Co., 1970.

Baer, D. M., Wolf, M. M., & Risley, T. R. Some current dimensions of applied behavior analysis. Journal of Applied Behavior Analysis, 1968, 1, 91-97.

Baker, S. P., Robertson, L. S., & O'Neill, B. Fatal pedestrian collisions: Driver negligence. American Journal of Public Health, 1974, 64, 318-325.

Bandura, A. Influence of models' reinforcement contingencies on the acquisition of imitative responses. Journal of Personality and Social Psychology, 1965, 1, 589-595.

Berfenstam, R., Gustafsson, L. H.,& Petersson, O. (Eds.). Uppsala Symposium on Prevention of Accidents in Childhood. Uppsala, Sweden: 1977.

Brooks, P. H. The role of action lines in children's memory for pictures. Journal of Experimental Child Psychology, 1977, 23, 98-107.

Brown, I., Jr. Role of referent concreteness in the acquisition of passive sentence comprehension through abstract modeling. Journal of Experimental Child Psychology, 1976, 22, 185-199.

Bryan, J. H., Redfield, J., & Mader, S. Words and deeds about altruism and the subsequent reinforcement power of the model. Child Development, 1971, 42, 1501-1508.

Bussey, K. & Perry, D. G. Sharing reinforcement contingencies with a model: A social-learning analysis of similarity effects in imitation research. Journal of Personality and Social Psychology, 1976, 34, 1168-1176.

Crowder, A. M. H., & Hohle, R. H. Time estimation by young children with and without informational feedback. Journal of Experimental Child Psychology, 1970, 10, 295-307.

Downing, C. Evaluation of national cycling proficiency training course. (TRRL Leaflet 563). Crowthorne, Berkshire, England: Transport and Road Research Laboratory, 1975.

Dowrick, P. W., & Raeburn, J. M. Video editing and medication to produce a therapeutic self-model. Journal of Consulting and Clinical Psychology, 1977, 45, 1156-1158.

Dubanoski, R. A. Imitation as a function of role appropriateness of behavior and response consequences to the model. Dissertation Abstracts, Section A, 1967, 27, 2613-2614.

Dueker, R. Threat detection training programs for child pedestrian safety Volumes 1 and 2. Washington, D. C.: National Highway Traffic Safety Administration, 1975.

Embry, D. D., Loebig, R. L., & Baer, D. M. Appealing to the preschooler's eye and ear: An analysis of multiple effects of storybook illustrations (ECI Document 126). Lawrence, KS: Early Childhood Institute, 1980.

Embry, L., Herbert-Jackson, E., Kelly, M. L., & Baer, D. M. Group-parent training: An analysis of generalization from classroom to home. (ECI Document 122). Lawrence, KS: Early Childhood Institute, 1978.

Fischer, P. L., & Torney, J. V. Influence of children's stories on dependency, a sex-typed behavior. Developmental Psychology, 1976, 12, 489-490.

French, J. E. Children's preference for pictures of varied complexity of pictorial pattern. Elementary School Journal, 1952, 52, 90-95.

Gordon, N. An experiment in cycle training in Cambridgeshire. Traffic Education, Autumn 1977, pp. 24-26.

Grayson, G. B. Observations of pedestrian behaviour at four sites (TRRL Laboratory report 670). Crowthorne, Berkshire, England: Transport and Road Research Laboratory, 1975.

Green, K. D., Forehand, R., & McMahon, R. S. Parental manipulation of compliance and noncompliance in normal and deviant children. Behavior Modification, 1979, 3, 245-266.

Grusec, J. E. Power and the internalization of self-denial. Child Development, 1972, 42, 93-105.

Gunther, R., & Limbourg, M. Dimensionen der Verkehrswelt Von Kindern, In: Unfall and Sicherheitsforschung Strawwenverkehr, Heft 4, Bundesanstalt f. Strassenwesen, Köln, 1976.

Guttman, J., Levin, J. R., & Pressley, M. Pictures, partial pictures, and young children's oral prose learning. Journal of Experimental Psychology, 1977, 69, 473-480.

Haddon, W. H., Jr., Options for prevention of motor vehicle injury, Israel Journal of Medical Sciences, in press.

Hersen, M. & Barlow, D. H. Single-case experimental designs: Strategies for studying behavior change. New York: Pergamon Press, 1976.

Hicks, D. J. Effects of co-observer's sanctions and adult presence on imitative aggression. Child Development, 1968, 39, 303-309.

Horner, R. D., & Baer, D. M. Multiple-probe technique: A variation on the multiple baseline. Journal of Applied Behavior Analysis, 1978, 11, 189-196.

Irwin, O. C. Infant speech: Effects of systematic readings of stories. Journal of Speech and Hearing Disorders, 1969, 3, 187-190.

Jackson, D. A., Mayville, W. J., & Cowart, J. B. The auto-pedestrian safety project. In G. Semb (Ed.), Behavior analysis and education. Lawrence, Kan.: The University of Kansas Press, 1972.

Jakibchuk, Z., & Smeriglio, V. L. The influence of symbolic modeling on the social behavior of preschool children with low levels of social responsiveness. Child Development, 1976, 47, 838-841.

Johnson, S. M., & Bolstad, O. D. Reactivity to home observation: a comparison of audio recorded behavior with observers present or absent. Journal of Applied Behavior Analysis, 1975, 8, 181-192.

Johnson, S. M., & Lobitz, G. K. Parental manipulation of child behavior in home observations, Journal of Applied Behavior Analysis, 1974, 7, 23-32.

Kaufman, J. M., Kneedler, R. D., Gamache, R., Hallahan, D. P., & Ball, D. W. Effects of imitation and nonimitation on children's subsequent imitative behavior. Journal of Genetic Psychology, 1977, 130, 285-293.

Kazdin, A. E. Research design in clinical psychology. New York: Harper & Row, 1980.

Keller, M. F., & Carlson, P. M. The use of symbolic modeling to promote social skills in preschool children with low levels of social responsiveness. Child Development, 1974, 45, 912-919.

Kelly, M. L., Embry, L., & Baer, D. M. Skills for child management and family support: Training parents for maintenance. Behavior Modification, 1979, 3, 373-396.

Kratochwill, T. R. Foundations of time-series research. In T. R. Kratochwill (Ed.), Single subject research: Strategies for evaluating change. New York: Academic Press, 1978.

Kueting, H. J., Boigs, R., & Winkler, W. Das verkehrsverhalten radfahrender Kinder und Jugendlicher--Untersuchungen zur empirischen Grundlegung der Verkehrserziehung (The traffic behavior of child and youth bicyclists: Inquiries for an empirical foundation of traffic education). (BASt Research Project FP 7510.1, unpublished). Cologne, West Germany: Bundesanstalt für Strabenwesen (BASt), 1978.

Levin, J. R., Bender, B. G., & Lesgold, A. M. Pictures, repetition, and young children's oral prose learning. AV Communication Review, 1976, 24, 367-380.

Lewin, K. Group decisions and social change. In E. Maccoby, T. M. Newcomb & E. Hartley, (Eds.), Readings in Social Psychology. New York: Henry Holt and Co., 1952.

Loeb, J. The incentive value of cartoon faces to children. Journal of Experimental Child Psychology, 1964, 1, 99-107.

Lovell, K., & Dixon, E. M. The growth of the control of grammar in imitation, comprehension, and production. Journal of Child Psychology and Psychiatry, 1967, 8, 31-39.

Lupercio, L., & Ribes, E. Comparative effects of extinction and time-out on reinforcement of imitative behavior. Revista Mexicana de Analisis de la Conducta, 1976, 2, 42-53.

Lutzker, J., Croiser, L., & Lutzker, S. The ironic effects of moral storybooks. Education and Treatment of Children, in press.

McLaughlin, M. W. Implementation as mutual adaptation: Change in classroom organization. Teachers College Record, 1976, 77, 339-351.

Melamed, B. G., Meyer, R., Gee, C., & Soule, L. The influence of time and type or preparation on children's adjustment to hospitalization. Journal of Pediatric Psychology, 1976, 1, 31-37.

Miller, W. What children see in pictures. Elementary School Journal, 1938, 39, 281-289.

Page, T. J., Iwata, B. A., & Neef, N. A. Teaching pedestrian skills to retarded persons: generalization from the classroom to the natural environment. Journal of Applied Behavior Analysis, 1976, 9, 433-444.

Pedestrian Safety Report, 1968: Vol. 1, AAA Special study of school child pedestrian accidents. Washington, D. C.: Traffic Engineering and Safety Department, 1968.

Perry, D. G., Bussey, K., & Perry, L. C. Factors influencing the imitation of resistance to deviation. Developmental Psychology, 1975, 11, 724-731.

Petersson, Owe. Summary of country reports. In R. Berfenstam, L. H.Gustafsson, & O. Petersson (Eds.), Uppsala Symposium on Prevention of Accidents in Childhood. Uppsala, Sweden: 1977.

Read, J. H. Traffic accidents involving child pedestrians: A program for their prevention. Pediatrics, 1969, 44, 832-838.

Rincover, A., & Koegel, R. L. Setting generality and stimulus control in autistic children. Journal of Applied Behavior Analysis, 1975, 8, 235-246.

Rosekrans, M. A. Imitation in children as a function of perceived similarity to a social model and vicarious reinforcement. Journal of Personality and Social Psychology, 1967, 7, 307-315.

Rudisill, M. Children's preference for color versus other qualities in illustrations. Elementary School Journal, 1952, 52, 445-451.

Russam, K. The psychology of children in traffic (TRRL Laboratory Report 295). Crowthorne, Berkshire, England: Transport and Road Research Laboratory, 1977.

Russell, J. C., Wilson, D. O., & Jenkins, J. F. Informational properties of jaywalking models as determinants of imitated jaywalking: An extension to model sex, race, and number. Sociometry, 1976, 39, 270-273.

Sidman, M. Tactics of scientific research: Evaluating experimental data in psychology. New York: Basic Books, 1960.

Siegler, R. S. & Richards, D. D. Development of time, speed, and distance concepts. Developmental Psychology, 1979, 15, 288-298.

Spolander, K., & Dahlstedt, S. Mellan och hoostadieekvers traffikumskapen 1972-1976 (Road safety education in the comprehensive school 1972-1976). (Report 118). Linkoping: Road and Traffic Research Institute, 1977.

Steinman, W. M. Generalized imitation and the discrimination hypothesis. Journal of Experimental Child Psychology, 1970, 10, 79-99.

Stewig, J. W. Assessing visual elements preferred in pictures by young children. Reading Improvement, 1975, 12, 94-97.

Thelen, M. H., & Rennie, D. L. The effect of vicarious reinforcement on imitation: a review of the literature. In B. A. Maher (Ed.), Progress in experimental personality research, Volume 6. New York: Academic Press, 1972.

Toner, I. J., Parke, R. D., & Yussen, S. R. The effect of observation of model behavior on the establishment and stability of resistance to deviation in children. Journal of Genetic Psychology, 1978, 132, 283-290.

Travers, R. M. A study of the advantages and disadvantages of using simplified visual presentations in instructional materials. Final Report on Grant No. OEG-1-7-070144 5235 U. S. Office of Education, 1969.

Van der Molen, H. H. Observational studies of children's road crossing behavior: A review of the literature. In A. S. Hakkert (Ed.), Proceedings of the International Conference on Pedestrian Safety (Volume 2). Haifa, Israel: Michlol, 1977.

Vital Statistics of the United States 1975: Volume II-Mortality, Part A (PHS-79-1141). Hyattsville, Maryland: National Center for Health Statistics, 1977.

Vital Statistics of the United States 1975: Volume II-Mortality, Part B (PHS-78-1102). Hyattsville, Maryland: National Center for Health Statistics, 1979.

Vladimir, G. The influence of various models in learning a complex motor task. Psychologie-Schweizerische Zeitschrift für Psychologie und ihre Anwendungen, 1976, 35, 99-116.

Walters, R. H., & Parke, R. D. Influences of response consequences to a social model on resistance to deviation. Journal of Experimental Child Psychology, 1964, 1, 269-280.

Whitehurst, G. J. Comprehension, selective imitation, and the C.I.P. hypothesis. Journal of Experimental Child Psychology, 1977, 23, 23-28.

Wike, E. L. Data analysis: A statistical primer for psychology students. Chicago, Aldine-Atherton, 1971.

Yeaton, W. H., & Bailey, J. S. Teaching pedestrian safety skills to young children. Journal of Applied Behavior Analysis, 1978, 11, 315-329.

Zebrowitz-McArthur, L., & Eisen, S. V. Achievements of male and female storybook characters as determinants of achievement behavior by boys and girls. Journal of Personality and Social Psychology, 1976, 33, 467-473.

APPENDIX A

Sample Outdoor Data Sheet

CHILD_____ DATE_____ OBSERVER_____

TIME START_____ TIME STOP_____ TIME START_____ TIME STOP_____ TIME START_____ TIME STOP_____ TIME START_____ TIME STOP_____

TOTAL TIME IN STREET_____ TOTAL TIME PLAYING_____ ☐ PERCENT OF TIME IN STREET

Total number of children in view of observer at beginning of session. _____

TOTAL number of children in view of observer at end of session._____

NONPLAY-OBJECT BEHAVIORS (Entering street)
(Check each time behavior occurs during observation)

	5	10	15	20	25	30	SUB TOTAL
Crawling							
Running							
Walking							

PLAY-OBJECT BEHAVIORS (Entering street)
(Check each time behavior occurs during observatinn)

Check if object present		
☐	Ball	
☐	Bigwheel	
☐	Bike	
☐	Cars/trucks (Small)	
☐	Frisbee	
☐	Gliders	
☐	Kites	
☐	Pedal cars	
☐	Pets	
☐	Roller Skates	
☐	Scooters	
☐	Skateboards	
☐	Trikes	
☐	Tyke trikes	
☐	Wagons	
☐	Other	

Parent Supervision | Average Time _____ Total count _____

START_____ STOP_____ START_____ STOP_____ START_____ STOP_____ START_____ STOP_____

Parent reprimands:

Parent praise: